XXV ODONATA

By F. F. LAIDLAW, *F.Z.S.*

(Plate xvi.)

INTRODUCTION.

Only a few of the specimens discussed below were taken actually on the Abor Expedition, but the collections combined are all from the northern and eastern frontiers of Assam and Burma, and may conveniently be considered together. In addition to those taken in the north-eastern part of Assam and the Abor foot-hills in 1911-12, and those collected by Mr. F. H. Gravely in the former year in the Amherst district of Tenasserim between Moulmein and the Siamese border, there are two lots of specimens, one collected by Mr. H. Stevens in the N. Lakhimpur district, Assam, and one obtained in 1911 by Capt. G. Topin in the course of an expedition to the north-east frontier of Burma With the exception of Mr. Stevens' collection, of which type specimens will be presented to the Indian Museum, the specimens are the property of that institution. Some 50 or 51 species are represented.

In all probability the numbers at present recorded from that part of Asia which includes Assam and Burma represent a bare half of the whole Odonate fauna. Available lists show these numbers to amount to about 100 species.

Accounts dealing especially with the dragonflies of further India are:

1. "Odonates de Birmanie," de Selys Longchamps. *Ann. Mus. Genov.*, (2) x (xxx), 1891, pp. 433–518.

de Selys gives a list of 88 species for Burma. His account is based chiefly on material collected by the late Signor Fea in the neighbourhood of Leitu and Bhamo.

2. "Liste des Neuropteres de l'Indo-China." Par M. René Martin. *Mission Pavie.*

Martin comments on the richness of the fauna of Tonquin. It seems likely that this fauna is tolerably distinct from that of the district under consideration here, and not improbably richer. Martin's list contains no fewer than 139 species.

3. "The Dragonflies of Burma and Lower Siam." (I) Calopteryginae. *Proc. U.S. Nat. Mus.*, xxviii, pp. 165–187. (II) Cordulegasterinae, Chlorogomphinae and Gomphinae. *Proc. U.S. Nat. Mus.*, xxxiii, pp. 267–317. By E. B. Williamson.

In these two papers Williamson gives a critical and valuable

study of these groups of Odonata, not only for Burma but of a great part of the whole Oriental Region, reviewing as he does species allied to those of Burma, but inhabiting neighbouring lands.

None the less our knowledge of the dragonflies of these countries is still so imperfect that it is of little use to discuss the geographical relationships of the area. I may briefly state my own belief on the subject is that the fauna of Burma as of other Indo-Malayan countries is the result of the intermingling of several groups—the result of several irruptions into the territory at different epochs. Such groups for want of a better term may be called 'strata.' Much field work and systematic study is necessary before it will be possible to distinguish one 'stratum' from another and to determine anything of its geological history.

Other references to literature will be found at the end of the paper.

SYSTEMATIC.

LIBELLULIDAE.

LIBELLULINAE.

1. *Amphithemis vacillans*, de Selys.

 1 ♂ (immature), Assam (*H. Stevens*).

 2 ♂♂ Kachin Hills, Upper Burma (*Capt. Topin*).

 Length of abdomen 23 mm.

 ,, hind-wing 27 mm.

Both of the specimens from Upper Burma are fully adult, and both have the third abdominal segment powdered with bluish-white bloom, which gives the insect a striking appearance.

2. *Lyriothemis acigastra* (de Selys).

 2 ♂♂, 1 ♀ (1 ♂ very immature).

The adult male and the female have been examined for me by Dr. Ris, who has kindly compared them with de Selys' actual type ♂. He has found them to be identical therewith; but not with the specimens described and figured in his Monograph under the name *L. acigastra* (1909). The latter specimens, which belong to Mr. Morton, represents an undescribed species.

3. *Orthetrum sabina* (Drury).

 1 ♂ Kawkareik to Third Camp, Amherst district, Lower Burma, 21-xi-11 (*F. H. Gravely*).

 1 ♀ Kobo, 400 ft., Abor Expedition (*S. W. Kemp*).

4. *O. glaucum* (Brauer).

 4 ♂♂ adult, 1 ♂ immature, 1 ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

One male has a cross-nerve in the triangles of both hind-wings, another has one triangle crossed and one free.

5. *O. pruinosum neglectum* (Ramb.).

 3 ♂♂, 1 ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

 1 ♂ Moulmein, Lower Burma, 16-xi-11 (*F. H. Gravely*).

 1 ♂ Upper Assam (*H. Stevens*).

6. *O. triangulare* (de Selys).
 1 ♂, 1 ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

7. *Palpopleura sexmaculata* (Fabr.).
 1 ♂, 2 ♀ ♀ North Lakhimpur, Upper Assam (*H Stevens*).
 1 ♂, 1 ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

8. *Nannophya pygmaea* (Ramb.).
 5 ♂ ♂, 2 ♀ ♀ Dejoo, N. Lakhimpur, Upper Assam (*H. Stevens*).

9. *Brachydiplax sobrina*, de Selys.
 1 ♂ Dejoo, N. Lakhimpur, Upper Assam (*H. Stevens*).

10. *Acisoma pancrpoides*, Ramb.
 1 ♀ Kawkareik, Amherst district, Lower Burma, 19—20-xi-11 (*F H. Gravely*).

11. *Diplacodes nebulosa*, Fabr.
 2 ♂ ♂ Dibrugarh, N. E. Assam, Abor Expedition, 17—21-xi-11 (*S. W Kemp*).

12. *D. trivialis* (Ramb.).
 2 ♂ ♂ Kawkareik, Amherst district, Lower Burma, 19—20-xi-11 (*F. H. Gravely*).
 1 ♂ Upper Assam, 31-iii-10 (*H. Stevens*).

13. *Crocothemis servilia* (Drury).
 1 ♂ Kachin Hills, Upper Burma (*Capt. Topin*).

14. *Neurothemis tullia* (Drury).
 1 ♂ N Lakhimpur, base of hills, Upper Assam (*H. Stevens*).

Belongs to the typical race of the species.

15. *N. intermedia*, Ramb. race?
 2 ♂ ♂ Dejoo, N. Lakhimpur, Upper Assam, 13-iii-10 (*H. Stcvens*).
 1 ♂ Silonibari.
 Length of abdomen 18·5 mm.
 ,, hind-wing 22·5 mm.
 ,, pterostigma 3 mm.

Slightly smaller than the typical race from Ceylon. The basal golden-brown mark on the hind-wing is less extensive also, reaching only to one cell beyond the triangle, whilst its outer border is regularly convex, thus differing from the specimen figured by Dr. Ris from Ceylon.

Examination of a sufficient series will probably prove these specimens to represent a geographical race of the species recognizable from that inhabiting Ceylon and southern India.

16. *N. intermedia degener*, de Selys.
 1 ♂, 1 ♀ Dejoo, 13-ii-10 (*H. Stevens*).
 ♂ Length of abdomen 23 mm.
 ,, hind-wing 26 mm.
 ,, pterostigma 3·5 mm.

The male has the brown colour of a mottled appearance due to the cells of the coloured parts of the wings being pale in their centres.

There is in the collection a female specimen of a *Neurothemis* taken by Capt. Topin in the Kachin Hills. The abdomen has a length of 19 mm., the hind-wing of 26 mm. The fore-wings are suffused with golden brown along the costal margin, and at the apex of the wing; the hind-wing is similarly coloured, whilst in addition it is suffused at its basal part with a less intense colour, reaching as far as three cells beyond the nodus.

The specimen belongs to the *intermedia* group, but I cannot assign it to a more exact position.

17. *N. fulvia*, Drury.
 1 ♂ Dejoo, N. Lakhimpur, Upper Assam (*H. Stevens*).
 1 ♂, 1 ♀ Dibrugarh N. E. Assam, 17—21-xi-11, Abor Expedition (*S. W Kemp*).

18. *Brachythemis contaminata* (Fabr).
 1 ♀ Sadiya, N E. Assam, Abor Expedition, 24—25-xi-11 (*S. W Kemp*).

19. *Sympetrum orientale*, de Selys.
 1 ♂ Sadiya, N. E. Assam, Abor Expedition, 24—25-xi-11 (*S. W Kemp*).

20. *Trithemis aurora* (Burm.).
 1 ♂, 2 ♀ ♀ Kachin Hills, Upper Burma (*Capt. Topin*).
 1 ♂ Dejoo, N Lakhimpur, Upper Assam (*H. Stevens*).
 1 ♀ Sadiya, N. E. Assam, Abor Expedition, 24—25-xi-11 (*S. W Kemp*).

21. *T pallidinervis* (Kirby).
 1 ♂ Dibrugarh, N. E. Assam, Abor Expedition, 17—26-x-11 (*S. W Kemp*).

22. *T festiva* (Ramb.).
 1 ♂ Kachin Hills Upper Burma (*Capt. Topin*).
 1 ♂ Dejoo, N. Lakhimpur, Upper Assam (*H. Stevens*).

23. *Rhyothemis variegata* (Linn.).
 1 ♂

24. *R. plutonia*, de Selys.
 1 ♂ Dejoo, N. Lakhimpur, Upper Assam (*H. Stevens*).

25. *Rhyothemis* sp.
 1 ♂ Dejoo.

The specimen belongs to the group *R. curiosa*, de Selys. Its dimensions are as follows:—

Length of abdomen 15 mm.
,, hind-wing 22 mm.

Several 'species' belonging to this group have been described from Malacca, Borneo, Sumatra and Menado as well as from Ceylon, but no example of the group has been hitherto recorded from Burma or Assam. As I have no series for comparison I will

not attempt to refer the present specimen to any of the 'species' or 'races' of the group.

According to Krüger (1902) the distribution of these species is as follows:--

R. fulgens, de Selys. Sumatra, Banca, Borneo, Singapore.
,, *curiosa*, de Selys. Siboga, Sumatra, Borneo, Singapore.
,, *obsolescens*, Kirby. Sumatra, Borneo, Ceylon.
,, *pygmaea*, Brauer. New Guinea, Celebes.

I have compared the specimen with an individual belonging to this group from Borneo, and can find no specific difference.

26. *Tholymis tillarga*, Fabr.
   1 ♂ Dejoo.

CORDULIINAE.

27. *Hemicordulia asiatica*, de Selys.
   1 ♂ Dejoo, N. Lakhimpur, base of hills, Upper Assam (*H. Stevens*).

This is one of the most interesting forms in the collection. Only one other specimen of the species is known, a male in the Selys' collection, from the Khasi Hills.

Mr. Stevens' specimen is fully mature and a little damaged. It agrees well with the type, whose wings and anal appendages have been figured by Martin (1907).

This species is apparently the only representative of the Eucordulina in tropical continental Asia. It belongs to a genus whose headquarters are in Australia. An allied species is found in Celebes and Borneo, and probably elsewhere in Malaysia, as well as in Papua; whilst closely related forms occur in Madagascar and in the Seychelles. It would thus appear to belong to an ancient 'stratum' of the Odonate fauna of the Old World tropics. Possibly some of the genera allied to *Coeliccia* amongst the Agrioninae belong to the same level although these do not appear to be represented on the Australian continent, whilst they occur in Papua.

AESCHNIDAE.

AESCHNINAE.

28. *Anax guttatus*, Burm.
   1 ♂ adult, 28-v-10 (*H. Stevens*).

This species is widely distributed, ranging from the Seychelle Is. to Queensland.

29. *Gynacantha khasiaca*, MacLachlan
   2 ♂ ♂ adult (in spirit), Kobo, alt. 400 ft., 8-xii-11, Abor Exped. (*S. W Kemp*).

Originally described from the Khasi Hills, as the name implies. These specimens have retained well their colouring, which is very brilliant. The head and eyes are green, with a black **T**-shaped mark on the frons above.

The thorax also is of a brilliant green, with a black median stripe, a pair of humeral bands and a lateral stripe on either side also black.

The abdomen is blackish above, with large auricles on the second segment. It is much constricted from the commencement of the third segment, and has blue-green markings.

A race of this species, *nigripes*, de Selys, has been recorded from 'Thibet,' and figured by Martin. This race would appear to be much less brightly coloured than is the typical form.

30. *Gynacantha* sp. sp.

3 ♀ ♀

1 ♀, 10-viii-10. Very immature and in bad condition, is in all probability a female of *G. khasiaca*, MacLachlan. The wings are tinged with saffron at the base and apex. The length of the hind-wing is 46 mm., the upper pair of terminal abdominal appendages are short, slender and pointed, scarcely so long as the ninth segment; the thorax gives indications of having a similar colour pattern to that of the male.

The two other females referable to this genus are also in a state which makes it impossible to describe them. They are possibly referable to *G. hyalina*, de Selys, but rather small for that species, the hind-wing having a length of about 41 mm. The upper pair of terminal abdominal appendages, broken in one specimen, are in the other long, about twice the length of the ninth segment, and leaf-like.

These specimens are dated 5-vi-10 and Dejoo, 1910, respectively.

GOMPHINAE.

31. *Leptogomphus* sp.

1 ♀ N. Lakhimpur (*H Stevens*).

The specimen belongs probably to an undescribed species, but its condition does not admit of a satisfactory description.

CALOPTERYGINAE.

32. *Neurobasis sinensis*, Linn.

2 ♂ ♂, 1 ♀ Thingannyinaung to Myawadi, Lower Burma, *ca.* 900 ft., 24—26-xi-11 (*F. H. Gravely*).

1 ♂ Sadiya, N.-E. Assam, Abor Expedition, 24—25-xi-11 (*S. W Kemp*).

1 ♂ Dejoo, N. Lakhimpur, Assam (*H. Stevens*).

33. *Vestalis gracilis* (Ramb.).

2 ♂ ♂, 2 ♀ ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

2 ♂ ♂, 1 ♀ Dejoo, Feb., June, 1910 (*H. Stevens*).

The range of this species will probably serve to delimit the Burmese region from the Malayan, the latter characterized by the closely allied *V amoena*, de Selys.

34. *Rhinocypha quadrimaculata*, de Selys.
2 ♂ ♂ Dejoo, Upper Assam (*H. Stevens*).
1 ♂ Silonibari, Upper Assam (*H. Stevens*).
1 ♂ (teneral) Kawkareik (*F. H. Gravely*).

AGRIONINAE.

"Legion" *Platycnemis.*

35. *Coeliccia bimaculata*, sp. nov. (Pl. xvi, fig. 1.)
1 ♂ Dejoo, Upper Assam, 25-v-10 (*H. Stevens*).
Length of abdomen 37 mm.
,, hind-wing 22·5 mm.

M_3 proximal to the nodus, *RS* a little distal. Quadrilateral with its costal margin, scarcely shorter than the anal, the difference is less than one-fifth of the whole length of the anal margin; relatively long, so that it occupies one-half of the distance between the level of the arculus and of the nodus, the other half being occupied by a single cellule. Costal side of pterostigma about equal in length to anal side.

Head, lower lip whitish, upper lip black with a white margin, the whole of the rest of the upper surface of head black; a pair of yellow-brown post-ocular spots of a wedge-shape excepted.

Prothorax, anterior margin black, dorsal surface primrose-yellow, posterior margin black, lower surface yellowish-white.

Thorax black above, pale yellow at the sides and below. On the lower part of the dorsal surface is a pair of large oval yellow spots, they extend upwards for not quite one-half of the length of the dorsum of the thorax.

Abdomen, 1 yellow, with a fine distal, terminal ring, and a dark brown semicircular mark anteriorly; 2 to 8 dark brown above, with traces of pale distal articular rings, the lower surfaces also paler; 9, 10 bright primrose-yellow, 9 has a fine black line dorsally, covering nearly its anterior half.

Anal appendages primrose-yellow, the upper pair equal in length to 10, rather stout, tapering, with a strong median ventral tooth. The lower pair longer, rather cylindrical, curved inwards at their extremities.

The great length of the quadrilateral characterizes this handsome insect, as does the remarkable colouring of the thorax and abdomen.

The British Museum has in its unincorporated material examples of a geographical race of the species from the Island of Hainan.

36. *Copera (Psilocnemis) annulata* (de Selys) subsp. *stevensi*, nov. (Pl. xvi, fig. 2.)
1 ♂ North Lakhimpur, foot of hills, Upper Assam (*H. Stevens*).
Length of abdomen 35 mm.
,, hind-wing 22·5 mm.

Upper lip bluish-white, the rest of the head yellow, with a large central, triangular black mark; its apex on the epistome, its base extending from one eye to the other, at the level of the hinder ocelli. The back of the head is black also.

Prothorax as in the typical *P. annulata*, black with a yellow band on either side.

Thorax bronze-black as far as the first lateral suture, with yellow antehumeral band. Sides and under surfaces gray-yellow, with a fine black lateral stripe.

Abdomen, 1, 2 bronze-black above, gray-yellow at the sides and below. Distal half of 9 and all 10 yellow, the yellow colour on 9 running forward dorsally to a point nearly at the commencement of the segment. The rest of the abdomen bronze-black above, paler below.

Legs white, the lower fifth of the femora black, as are the spines and tarsi. The first pair of tibiae have a black line on their posterior surfaces, and are not dilated; the remaining pairs have a fine black mark at their bases posteriorly, and are much dilated.

Anal appendages, upper pair yellow, nearly equal in length to segment 10, cylindrical, pointed. Lower pair about twice as long, curved downwards, the basal half of each yellow, the distal half black

Sufficiently distinct from the type to deserve recognition as a geographical race of a widely distributed form.

37. *Copera (Psilocnemis) vittata*, de Selys, subsp. *assamensis*, nov.

1 ♂ 1 ♀ N. Lakhimpur, base of hills, Upper Assam (*H. Stevens*).

Length of abdomen ♂ 32 mm. ♀ 30 mm.
,, hind-wing ♂ 17 mm. ♀ 17 mm.

♂ General colour russet-brown.

Head, upper lip yellowish-brown. The rest of the upper surface of the head brown, except for a black line running from eye to eye immediately in front of the antennae, and the basal joint of each antenna which is also black.

Prothorax and thorax brown. There is a broad dorsal band of a bronze-black colour on the thorax, and the sides of the prothorax and thorax have black markings, which especially on the thorax, are mottled in character. Abdomen brownish-black above, paler below, 3, 4, 5, 6 have a fine basal white ring contracted above, and a narrow distal black ring not reaching quite to the end of the segment. Distal half of 9 and all 10 pale yellowish-brown.

Legs rich russet-brown with black spines, the posterior pair of tibiae show a trace of dilatation.

Anal appendages dull brown, upper pair one half the length of lower pair. Both pairs straight, tapering, cylindrical.

♀ (22-8-10). The position of this individual is uncertain. The specimen is teneral and generally resembles the male in colour.

It differs in having a broader black stripe across the front of the head, and the back of the head black instead of brown, the thorax is entirely brownish-black with numerous fine yellow spots; the whole abdomen is brown, and the legs are of a paler colour than in the male, with a dark mottled line posteriorly. The prothorax has a pair of short forwardly directed spurs projecting from the middle of its dorsal posterior margin.

This subspecies is one of several geographical races referable to the group *Copera vittata*.

The group is characterized by the anal appendages of the males and according to Förster by the occurrence of dimorphism amongst the females. The female described above is on his view to be regarded as a "virago" form. The females are also remarkable for the possession of the prothoracic spurs. The only other member of the group that I have had an opportunity of examining is *C. vittata atomaria*, de Selys, from Borneo.

This subspecies is very closely allied to *C. assamensis*, and a single female belonging to it is identical in colouring with the male.

The group includes the following:—

C. vittata vittata, de Selys. Malacca.
,, ,, *serapica*, Hagen. Nicobars.
,, ,, *imbricata*, Hagen. Sumatra.
,, ,, *atomaria*, de Selys. Borneo.
,, ,, *assamensis*, subsp. nov. Assam.

"Legion" *Agrion*.

38. *Onychargia vittigera* ? de Selys.

1 ♂ Dejoo; N. Lakhimpur (*H. Stevens*).

A teneral male, unfortunately lacking the last 4 segments of the abdomen.

39. *Archibasis oscillans* (de Selys). (Pl. xvi, fig. 3.)

4 ♂ ♂ Dejoo, 3-iv-10 (*H. Stevens*).

Length of abdomen 36 mm.
,, hind-wing 25 mm.

I refer these specimens here with doubt. I have not been able to compare them with an authentic example.

They show certain differences from de Selys' description which I note below—

The upper lip is black, not pale. Only one of the specimens, which are all very adult, shows any sign of post-ocular spots; and these are very small.

The side of the thorax appears to be of a dark greenish-brown with broad blue stripes; but in all it is pulverulent and consequently it is not an easy matter to determine the true character of the colouring.

The first segment of the abdomen is entirely black.

The lateral view of the anal appendages agree well with de Selys' description of that of the type. Seen from above, however,

the upper pair are distinctly hatchet-shaped (the blade of the hatchet being partly visible from the side) and not cylindrical.

In spite of these differences I believe Mr. Stevens' specimens must be identified with de Selys' species; the agreement in other respects is very close, and if looked at from above obliquely, the upper anal appendages do appear to be cylindrical.

Mr. Stevens has extended the known range of this form very considerably; it has hitherto been recorded from Sumatra and Siam.

40. *Aciagrion pallidum*, de Selys. (Pl. xvi, fig. 4.)

1 ♂, 2 ♀ ♀ Dibrugarh, N. E. Assam, Abor Expedition, 17—21-xi-11 (*S. W Kemp*).

Length of abdomen ♂ 32 mm. ♀ 29 mm.
,, hind-wing ♂ 19 mm. ♀ 19 mm.
Postnodals 10-11.

These specimens, which have been preserved in spirit, differ to some extent from those described by de Selys.

They are a little larger. The type male had the abdomen 28-29 mm. long.

The post-ocular mark is a light greenish-brown.

The thorax has in both sexes a fine antehumeral line of pale metallic green, and there is a lateral stripe of the same colour. The abdomen of the male has 1 7 metallic black above, 8-10 almost white, 10 is very short.

In the females, 6, 7 have a dorsal longitudinal dark stripe of metallic black, the rest of the abdomen is very pale brown above, and white below.

The appearance of the anal appendages seen from the side is figured for comparison with those of *A. borneensis*, Ris.

41. *Ischnura rufostigma*, de Selys. (Pl. xvi, fig. 5.)

1 ♂ Dibrugarh, N. E. Assam, Abor Expedition, 17—21-xi-11 (*S. W Kemp*).

The specimen is a trifle smaller than the type, which I believe to be the only example of the species hitherto known.

The colouring agrees generally with that of the type. The post-ocular spots are however small, the sides of the thorax and prothorax are of a blue-green shade, not "roux jaunâtre."

The whole of the dorsal surface of segment 8 of the abdomen is black.

The difference between the pterostigmata of the fore and hind wings does not seem to me to be very marked. It is emphasized by de Selys in his description.

Unfortunately the female of the species remains unknown.

The insect is a very handsome one. It is interesting to be able to give a more precise localization for the species than the rather vague indication, India.

42. *Pseudagrion* sp.

1 ♀ Dibrugarh.

43. *Ceriagrion coromandelianum* (Fabr.) (Pl. xvi, figs. 8, 8*a*.)

1 ♂, 4 ♀ ♀ Dibrugarh, N. E. Assam, Abor Expedition, 17—21-xi-11 (*S. W Kemp*).

Length of abdomen ♂ 35 mm. ♀ 32·5 mm.

,, hind-wing ♂ 26 mm. ♀ 21·5 mm.

Considerably larger than the type which has the abdomen 28-30 mm. long. These specimens agree in other particulars and are, I believe, rightly to be ascribed here. The male is, however, without broad light brown band on the head between the eyes. The upper pair of anal appendages is almost black. The females are of a duller colour than the male, a sandy or tawny-yellow.

44. *Ceriagrion olivaceum*, sp. nov. (Pl. xvi, fig. 9.)

2 ♂ ♂, 2 ♀ ♀ Kachin Hills, Upper Burma (*Capt. Topin*).

Length of abdomen ♂ 38·5 mm. ♀ 39 mm.

,, hind-wing ♂ 25 mm. ♀ 25 mm.

Fourteenth and fifteenth antenodal cross nerves on fore-wing. Pterostigma brown, covering rather more than one cell.

♂ Head, under surface pale yellowish-brown, upper surface entirely brown with a somewhat green shade, the brown of the upper lip of rather a warmer tinge. Second joint of antennae black at its apex, the distal parts also black.

Prothorax brown with a slight olive shade on the sides, paler below. Thorax brown above, with a darker rather green antehumeral stripe on either side not reaching the summit of the thorax. Laterally the thorax is olive-green with a brown metepisternal area. Beneath it is pale olive-green, rather pulverulent. The legs are pale brown, with the spines and articulation of the tarsal joints brownish-black.

Abdomen dull brown above, progressively darker to the end of 8; 9 and 10 a little lighter, 10 with its posterior margin embayed angularly.

Anal appendages brown, lower pair black at the apex, upper pair rather shorter than the lower pair, curved a little downwards. Lower pair ending in an upwardly directed spur.

♀ Colouring in general very similar to that of the male but duller, the pterostigma is paler; moreover this sex appears to lack the antehumeral band on the dorsum of the thorax.

This species, which appears to be quite distinct from its congeners, differs from them in its greater size; so far as I know it is certainly the largest species of the genus.

Most nearly related to it I believe is *C. coromandelianum*, Fabr. This latter species is different in general appearance, being of a pale almost lemon-yellow, judging from the spirit specimen of the male, which is also without the antehumeral stripe; whilst the anal appendages are widely different, as is the shape of the posterior dorsal margin of the tenth abdominal segment. The females of *C. coromandelianum* referred to above bear a very strong resemblance to the female specimens of *C. olivaceum*, they differ especially in size, in the lesser number of post-nodal nerves, 10–11

as opposed to 14–15 in *C. olivaceum*; in colour being much lighter than *C. olivaceum*, and in having no colour pattern on the sides of the thorax.

I have also compared these specimens with a pair of insects from N Queensland, received from Mr. Tillyard and named by him *C. glabrum*, Burm. These are possibly identical with specimens named *C coromandelianum* race *erubescens* by de Selys in his paper on the "Odonata of Burma."

Whether this be so or no Mr. Tillyard's specimens are I believe unquestionably examples of *C. glabrum*, Burm., and are totally distinct in colouring and other particulars from either of the species in the present collection. *C. melanurum*, de Selys, I am not acquainted with but it is sufficiently characterized by the black metallic mark on the terminal segments of the abdomen. Lastly *C. cerinorubellum*, Brauer, of which species I have examined a number of individuals from Borneo, is readily distinguished by its colouring in both sexes, and by the long curved inferior anal appendages of the male

45. *Argiocnemis obscura*, sp. nov. (Pl. xvi, fig. 6.)

1 ♂ Dejoo, N. Lakhimpur, base of hills, Upper Assam 5-iv-10 (*H. Stevens*).

Length of abdomen 30 mm.
,, hind-wing 20 mm.

The wings cease to be petiolated a little before the level of the basal post-costal nerve. Arculus beyond the level of the second antenodal nerve. Upper side of quadrilateral of fore-wing two-thirds length of lower side, of hind-wing three quarters the length. Pterostigma oblique, black, covering one cell.

Head, upper lip greenish-blue; genae and a line across the frons brownish-yellow, a pair of large post-ocular spots, nearly circular, greenish-blue. The rest of the upper surface of the head black.

Prothorax entirely black above with the exception of a small yellow mark on the anterior margin.

Thorax, black above, blue at the sides. There is a pair of narrow greenish-blue antehumeral stripes, and also a black lateral band at the second lateral suture.

Abdomen, 1–7 bronze-black, 1, 2, 3 blue at the sides and below, 8, 9 yellowish-brown, with terminal black mark, 10 black.

Anal appendages, upper pair black, lower pair dark brown.

Legs, femurs dark brownish-black; tibias lighter brown with dark articulation.

The upper pair of anal appendages are about as long as segment 10, seen in profile, they are finger-shaped, rounded at their extremities. On the inner surface they are concave, and each carries very near its base a downwardly directed spur; not seen in profile.

The lower pair are not so long; each carries at its apex three small tooth-like projections, which lie at the angles of a triangle with its apex upwards and to the outside.

46. *Argiocnemis aborense*, sp. nov. (Pl. xvi, fig. 7.)

1 ♂ Dibrugarh.

Length of abdomen 24 mm.
,, hind-wing 16 mm.

Post-nodal nerves 8-9 on fore-wing.

Arculus placed well beyond the level of the second antenodal, very sharply angled. Quadrilateral rather long, its upper side in both fore and hind-wings about three-quarters the length of its lower side. Pterostigma black, moderate, oblique, covering one cell.

Head, upper surface entirely black, save for a pair of nearly circular post-ocular spots which are blue

Prothorax, black above, with a very small blue spot at the side of the posterior margin.

Thorax, black above, with a blue-green antehumeral stripe on either side; laterally bright blue, with a black line along the second lateral suture; below whitish.

Abdomen black, segments 9, 10 bright blue with fine black margins, 10 with a dorsal longitudinal black line; 1, 2 are blue at the sides, and have also a small blue dorsal mark anteriorly, and the black is contracted suddenly near the hinder end of the segment so that it has here only a fine median dorsal black line; 3 and 4 have a fine lateral blue-green stripe running along the anterior $\frac{5}{6}$ of the segment on either side, broader anteriorly; 5, 6, 7 have a small lateral mark of the same colour at their anterior ends. The lower half of the sides of 8 is bright blue.

Legs, femurs black behind, whitish-grey in front, tibias and tarsi yellow with darker articulations.

Anal appendages black, upper pair about half the length of segment 10, hooked downwards and inwards, compressed laterally; lower pair shorter, conical, tapering rapidly and directed upwards.

The first of these species of *Argiocnemis* is closely allied to *A. lunulata*, de Selys The most obvious difference is that in *A. obscura* segments 7 and 10 of the abdomen are black; further in 2 the blue at the sides of the segment forms ' lunules ' but these are very small not merely separated by the dorsal ridge. The upper pair of anal appendages are longer, and less incurved at their apices than in de Selys' species, to judge by the figure of these given by Dr. Ris (1900). On the other hand *A. aborense* is very distinct from any of the described members of the genus, which will prove to be a large one. I have at present several unnamed species belonging to it awaiting description.

47. *Argiocnemis* sp.

1 ♂ Dejoo, N. Lakhimpur, base of hills, Upper Assam (*H. Stevens*).

An imperfect specimen, perhaps *A. rubeola*, de Selys.

48. *Argiocnemis lacteola*, de Selys.

3 ♂ ♂, 1 ♀ Dibrugarh, N. E. Assam, Abor Expedition, 17—21 x-11 (*S. W Kemp*).

5 ♂ ♂ Dejoo, N. Lakhimpur, March, June, 1910 (*H. Stevens*).

One of the specimens from Dejoo has an additional antenodal nerve on the right fore-wing. It is rather remarkable to find this abnormality, which is I believe very rare, in so small an insect

Described from a specimen taken by Mr. Atkinson in Bengal.

49. *Argiocnemis nana*, sp. nov. (Pl. xvi, fig. 10.)

1 ♂ adult, Kachin Hills, Upper Burma.

Length of abdomen 18 mm.

,, hind-wing 9 mm.

Pterostigma gray, with a broad white border on its anterior and outer margins. Six post-nodal nerves on the fore-wing.

Head, lower lip white, the under surface of the eyes bright blue; upper lip blue, with a broad black line at its base, the rest of the lower half of the anterior aspect of the head blue to the level of the base of the frons, which has a black line. The rest of the upper surface black, including the upper half of the eyes. Post-ocular space blue.

Prothorax black above, blue at the sides, the posterior margin with a well-marked median lobe, slightly bifid.

Thorax, upper surface black with a narrow blue antehumeral stripe. Sides blue, with a small black spot at the base of the second pair of wings, on the second lateral suture.

Abdomen blue variegated with black; 1 has a square black mark occupying its dorsal surface; 2 a longitudinal black dorsal stripe, contracted posteriorly, and with a pair of oval blue enclosures before its middle; 3--7 each have a longitudinal dorsal stripe which widens at its posterior end, then contracting again immediately before its termination; 8 has the black mark confined to the dorsum for its first half, for the second half it expands on to the sides of the segment; 9, 10 are almost entirely black save for a small blue area on the lower parts of the sides of 9.

Anal appendages, upper pair longer than lower pair, pale blue above, black below. This pair is rather bluntly conical, a trifle longer than segment 10. On their inner side they are convex and slightly inclined to one another; from their ventral margin depends a large hook-like structure which is directed downwards, and at its apex outwards and backwards. The lower pair are thick at the base, directed upwards, bifurcated, with a crescentic posterior margin.

This species clearly belongs to the group which includes *A. pygmaea*, Ramb., and *A. minima*, de Selys

It differs from these species in having the upper lip largely of a bright-blue colour, *not metallic*, in the colour of the pterostigma, in the absence of orange or red colouring on the terminal segments of the abdomen, and in the characters of the anal appendages.

50. *A. pygmaea* (Ramb.)

1 ♂ 26-iv-10 (*H. Stevens*).

51. *A. incisa*, Hagen.

1 ♂, 1 ♀ Dibrugarh, N. E. Assam, Abor Expedition, 17—21-xi-11 (*S. W Kemp*).

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